Introductory Notes on the Braille
Systen of Reading and Writing
for the Blind

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INTRODUCTORY NOTES

ON

THE BRAILLE SYSTEM

OF READING AND WRITING FOR THE BLIND

April 15, 1959

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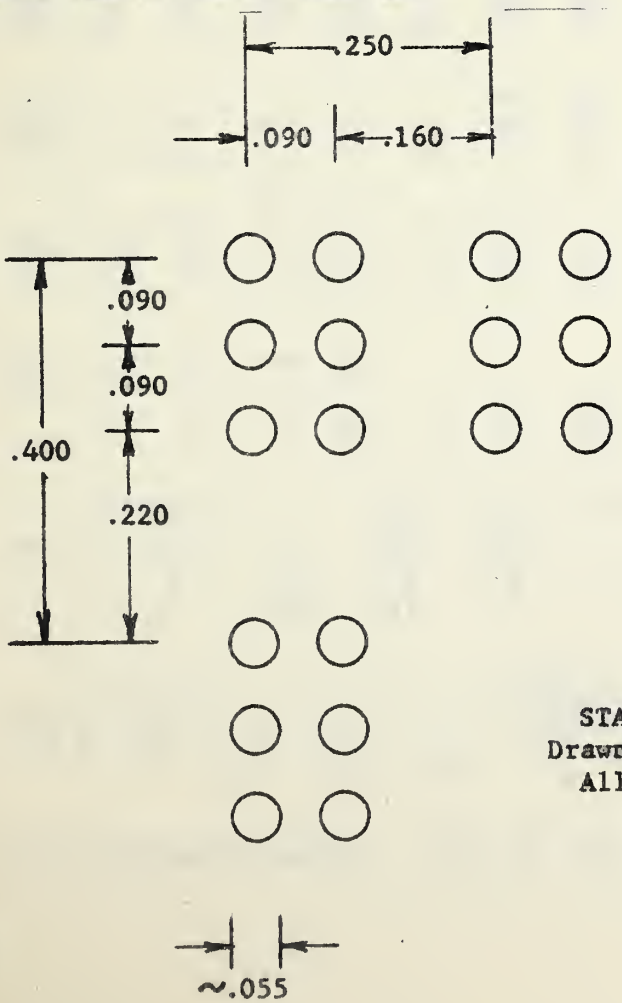
THE BRAILLE SYSTEM

This brief description of braille has been prepared for the purpose of answering some of the numerous questions raised at previous technical sessions on reading machines for the blind sponsored by the Veterans Administration. It is intended especially for those who expressed interest in possible systems for the automatic production of braille for the tactile output of reading machines.

Louis Braille, a French saddle-maker's son, born in 1809, was blinded at the age of three. He was sent to a school for the blind in Paris, where he later became an instructor. As part of his teaching method he used a raised dot scheme of reading developed by Charles Barbier, an officer in Napoleon's army. Braille found this system inadequate in many respects and devised an improved system which, with subsequent modifications, has been internationally adopted.

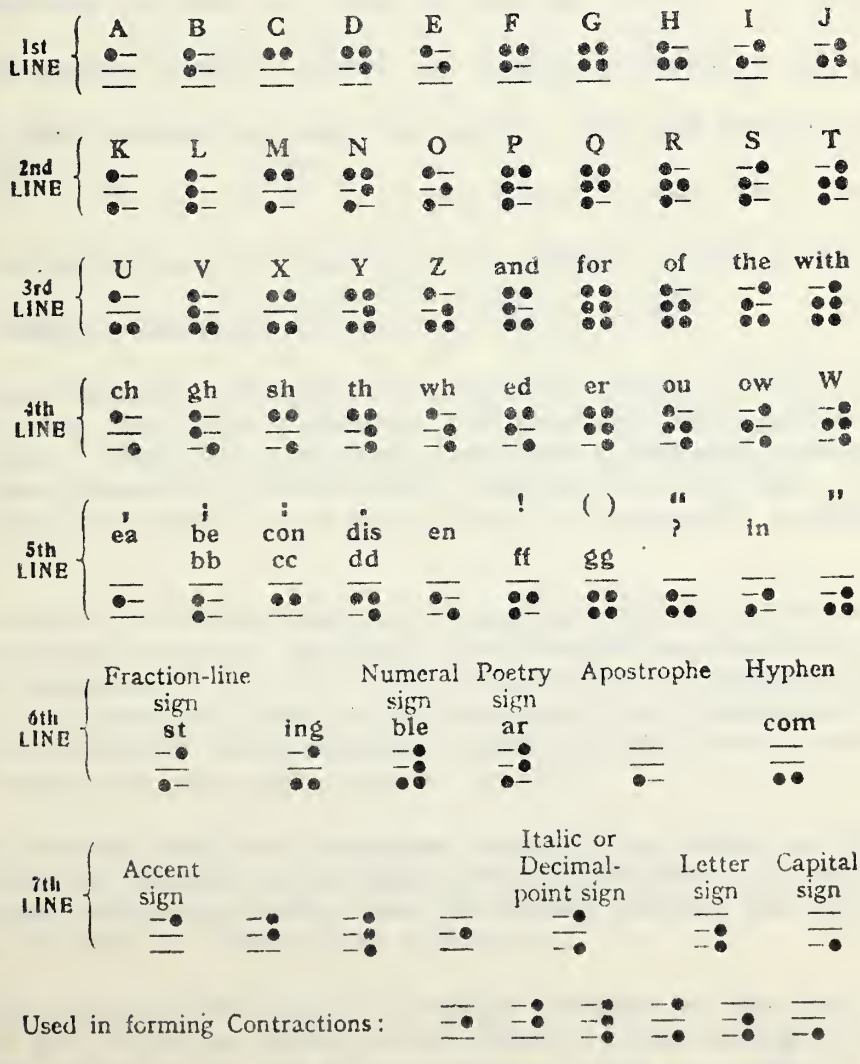
The improved alphabet of dots Braille designed is a series of "cells", each potentially three dots high and two dots wide. ⠿ The distance between the dots of a single cell is .090"; between each braille cell, .160"; between each letter, .250"; and between each line of braille, .220". These distances are measured from dot center to dot center, as shown in the following diagram:



STANDARD BRAILLE DIMENSIONS
Drawn Five Times Actual Size
All Dimensions In Inches

The dots are usually embossed .015" above the surface of undisturbed paper, and have a base diameter of .055". Because the cells are larger than the average ink-print letter, and each page must be of sufficient thickness to retain the protruding dots through many readings, a book printed in braille will obviously be larger and bulkier than an ink-print edition. Bulk is further increased by the fact that hand-embossed braille is on one side of a sheet only. Press braille, however, can be "inter-pointed", or embossed on both sides of a sheet by precise displacement, so that the dots do not cancel each other

The six dots of the braille cell are numbered, for convenience, from upper left to lower left -- 1, 2, 3 -- and from upper right to lower right -- 4,5,6. The dots can be combined to form 63 different symbols, including all the letters of the alphabet, Arabic numerals, some diphthongs and other combinations of letters, punctuation marks, capitals, and contractions for certain common words. The complete alphabet, along with many of the braille symbols used for contractions, punctuation, etc., appears in the following table:



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An important feature of Braille's "cell" system is the "Principle of Logical Sequence". According to this principle, the first ten letters of the alphabet form the bases for all other letters and signs. These appear in the first line of the foregoing table. The braille symbol for the eleventh letter, "K", is the symbol for "a", with the addition of the lowest left hand dot in the cell (dot 3), and so on for the second series of ten letters. The third series, starting with the letter "u", contains two dots in the lowest positions of the cell (dots 3 and 6). The letter "w", it will be noted, does not appear in its proper place in the third line, because this letter was not used in the French language. It appears at the end of the fourth series of braille symbols, which is distinguished by the addition of only the lower-right dot (dot 6) to the ten basic symbols.

The "Principle of Logical Sequence" also applies to the Arabic numerals, the first ten numerals corresponding to the first ten letters of the alphabet, with the important addition of a special numeral symbol, ⠼ preceding each numeral. The special numeral symbol is, itself, a separate cell, so that each numeral will contain at least two cells. Thus the numeral "1" is: ⠼⠁ "2" is: ⠼⠃ "3" is: ⠼⠉ ; and so on for the first ten numerals. In the case of multiple digit numerals, the numeral symbol is still used only once. For example, the numeral "127" is: ⠼⠁⠃⠛

Another important feature of the Braille system is that it can be written easily by the blind themselves. A specially constructed slate and stylus are used. There has also been developed a keyboard type of instrument, similar to the typewriter, which merely requires six keys and a space bar. Earlier systems of embossed line print could not be easily reproduced by the blind.

Some historical background may illustrate the ingenuity of Braille's original invention, which so admirably foreshadowed and used much of modern information concepts. A review of the disputes and compromises involved in the present standards will help us to appreciate the reluctance of workers for the blind to modify these standards, even to facilitate the mechanical or automatic translation and production of braille.

Braille first made his invention known at his school in Paris in 1829, and brought out an amended and extended version in 1834. It was not until 1854, two years after his death, that the school adopted the dot system as its official medium for reading and writing.

In this country the first to display interest in the braille system was a school for the blind in St. Louis, where it was introduced in 1860. Most American educators of the blind, however, were not ready to accept braille

as originally worked out, but tried to make it more efficient with modifications of their own. Leading in this movement was a New York institution where there was developed a dot system known as the New York Point, differing from braille in that it was two dots high and had a base of variable length. It rejected the "Principle of Logical Sequence" and advanced the "Principle of Frequency of Recurrence", by which the smallest number of dots was assigned to the letters most frequently used. This, the institution argued, resulted in greater speeds of reading and writing. Another modification of braille, known as American braille, used the original braille cell along with New York Point's "Principle of Frequency of Recurrence". By the beginning of the twentieth century, the rivalry among the different systems was at its height. Books for the blind printed during this period represented the several approaches to the dot system of reading.

By 1905 the British had worked out three grades of braille, using the standard six-dot cell. Grade One, consisting of the letters of the alphabet, and symbols for punctuation, capitalization, and numerals, was fully spelled out. Grade Two had approximately 200 contractions, i.e., symbols representing groups of letters, whole words, and parts of words. Grade Three had an even higher number of contractions. The average braille reader, slowed down by the highly contracted Grade Three, found Grade Two the most rapid. Writing speed increased progressively with eadh grade, but so, too, did the difficulty of learning.

An American committee, appointed by the American Association of Workers for the Blind, gave particular consideration to Grade Two. The committee would not accept all the British contractions and worked out a modification which they called Grade-One-And-A-Half, containing 44 contractions. The British did not respond favorably to this modification, but eventually a compromise was reached. The American committee accepted most of the British contractions, and the British did some further simplifying of their own. The compromise version came to be known as Standard English Braille (Grade Two) containing 185 contractions. It was adopted by English-speaking countries in 1932, and rules were set up to insure uniformity in embossing.

Standard English Braille is not only used for the reading and writing of text, but for music as well. The system, in fact, makes the reading and writing of music easier for the blind than for the sighted. Arithmetic and even higher mathematics are also within the scope of Standard English Braille. When applied to such fields as music and mathematics the braille dot combinations are, of course, re-used for different meanings.

The accompanying sheet of Grade Two braille, prepared by a business machines manufacturer on a rotary office-type machine, gives the reader the look and feel of one kind of embossed [redacted] print. Note the use of contractions and the special symbols for capitalization and punctuation.

ACKNOWLEDGEMENTS

The authors wish to thank all those who contributed to this paper by providing materials, suggestions, and information, and also those who served to review the manuscript. Various works on the subject, as shown in the bibliography below, were liberally drawn upon in preparing this article. We can mention by name only a few who helped with this report, but all assistance is deeply appreciated:

Mr. John Dupress
Chairman, Committee on Technical Research
Blinded Veterans Association

Mr. Howard Freiberger
Electronic Scientist
Veterans Administration

Mr. Bernard Krebs
Librarian and Braille Instructor
New York Guild for the Jewish Blind

Mr. Paul Langan
Chairman, Braille Authority
American Assoc. Workers for the Blind and
Amer. Assoc. Instructors of the Blind

Miss Helga Lende
Librarian
American Foundation for the Blind

Mr. Charles G. Ritter
Consultant, Special Aids and Appliances
American Foundation for the Blind

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